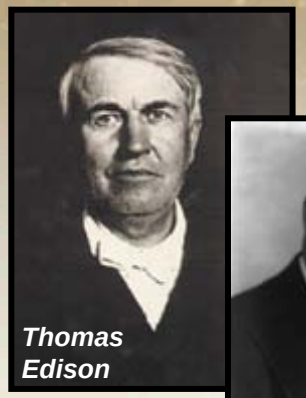

2010
ONR Naval
S&T Partnership
Conference
Next Generation Technologies for Today's Warfighter
ONR
Revolutionary Research . . . Relevant Results
RADM Nevin P. Carr Jr.
Chief of Naval Research
OFFICE OF NAVAL RESEARCH

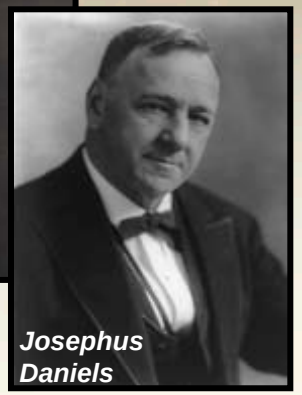
The Office of Naval Research

Revolutionary Research . . . Relevant Results

Naval Research Laboratory *(Appropriations Act, 1916)*

"[Conduct] exploratory and research work…necessary …for the benefit of Government service, including the construction, equipment, and operation of a laboratory…."


Thomas Edison


Josephus Daniels

Office of Naval Research *(Public Law 588, 1946)*

"…plan, foster, and encourage scientific research in recognition of its paramount importance as related to the maintenance of future of naval power, and the preservation of national security…"

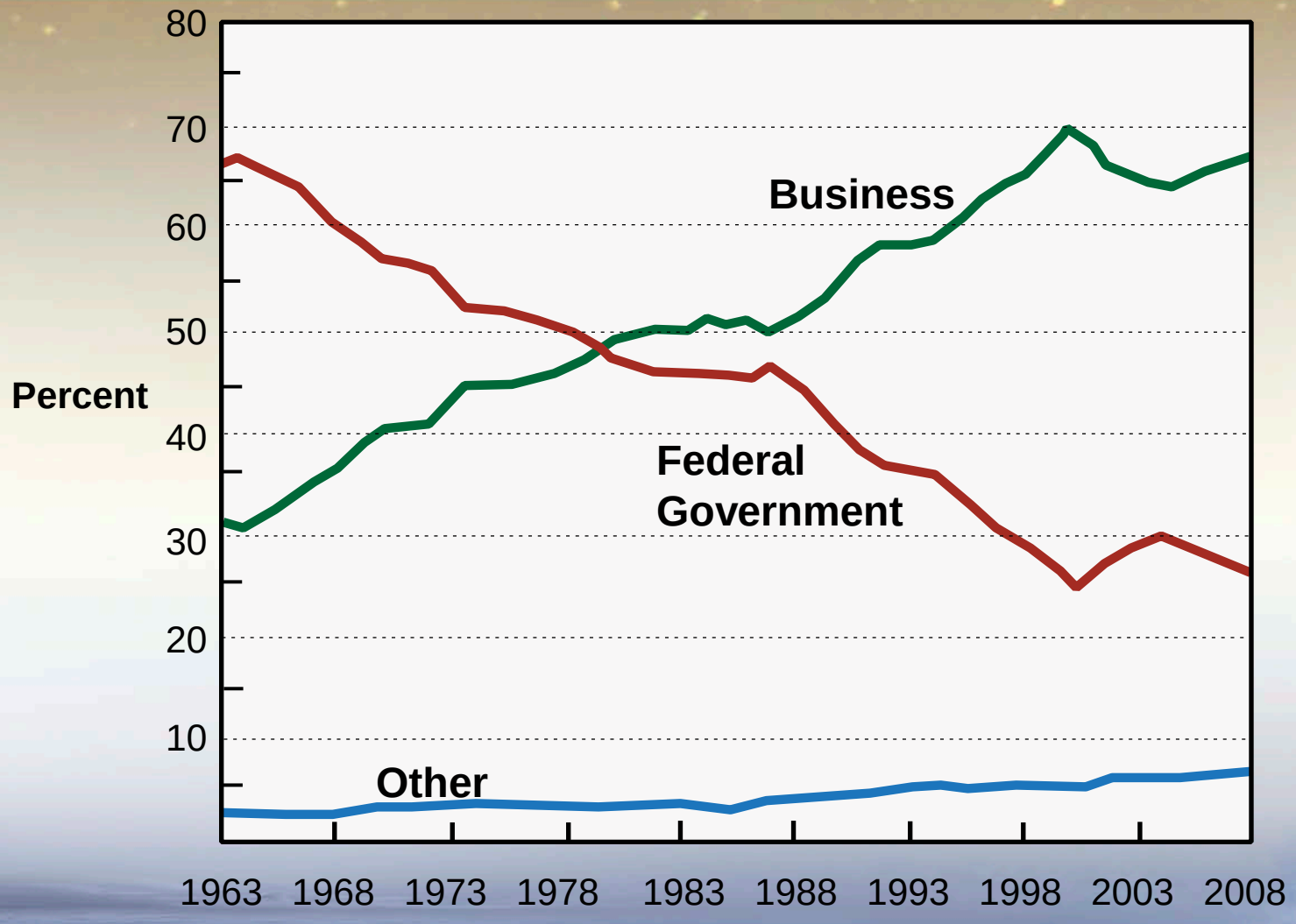

Harry S. Truman


Vannevar Bush

Transitioning S&T *(Defense Authorization Act, 2001)*

"…manage the Navy's basic, applied, and advanced research to foster transition from science and technology to higher levels of research, development, test, and evaluation."

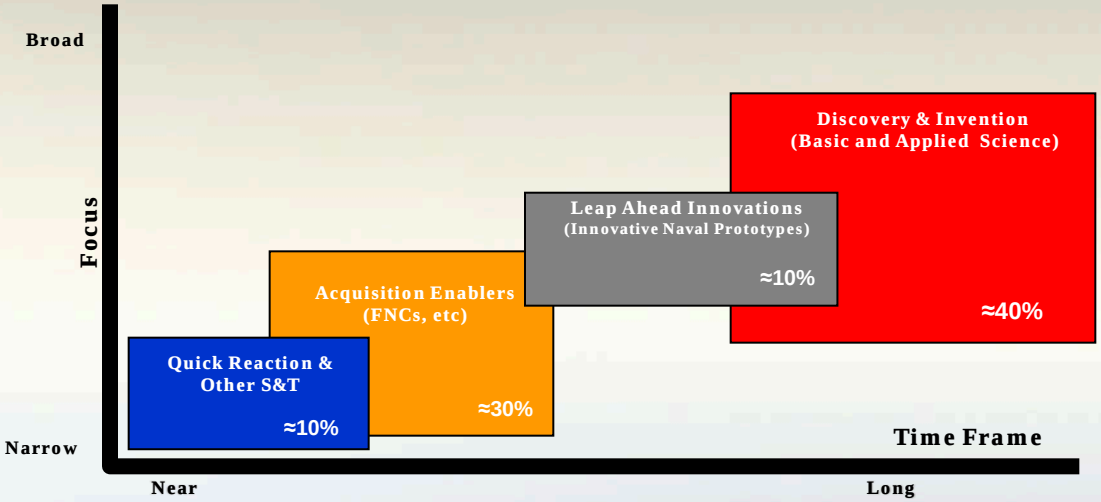
National R&D Investment



Source: National Science Foundation, Division of Science Resource Statistics, *Science and Engineering Indicators 2010*

Naval S&T Strategic Plan

Revolutionary Research . . . Relevant Results



Focus Areas:

- Power and Energy
- Operational Environments
- Maritime Domain Awareness
- Asymmetric & Irregular Warfare
- Information Superiority and Communication
- Power Projection
- Assure Access and Hold at Risk
- Distributed Operations
- Naval Warfighter Performance
- Survivability and Self-Defense
- Platform Mobility
- Fleet/Force Sustainment
- Total Ownership Cost

Tech Solutions

FNCs

INPs

D&I

How We Execute

ONR Global

FFRDCs

UARCs/Academia

Industry

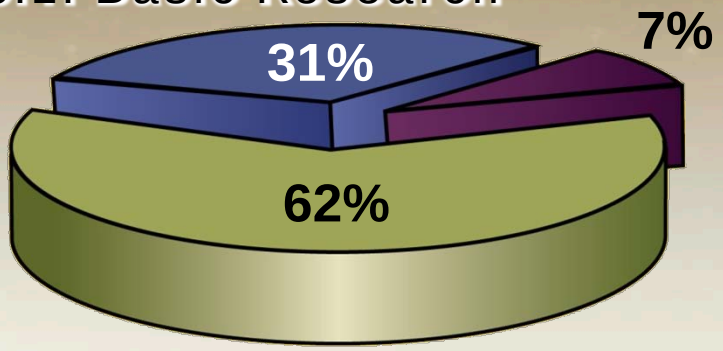
NRL/Warfare Centers

- 70 Countries
- 50 States
- 1,078 Companies
  - 859 small business
- 1,035 Universities & Nonprofit Entities
- 3,340 Principal Investigators
- 3,000 Grad Students

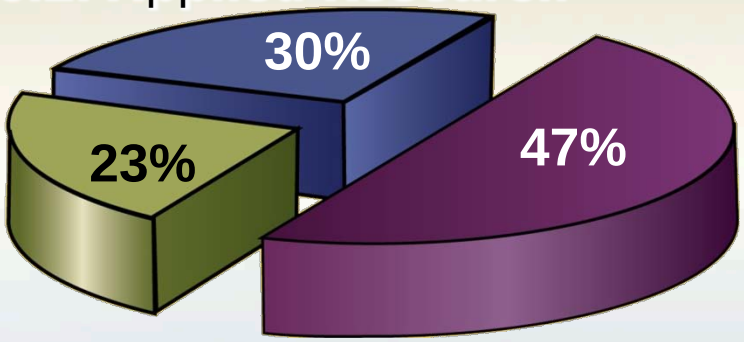
Investment Balance

Revolutionary Research . . . Relevant Results

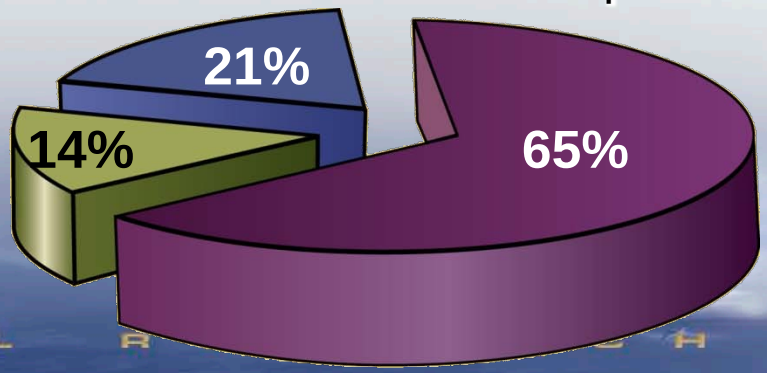
6.1: Basic Research



6.2: Applied Research



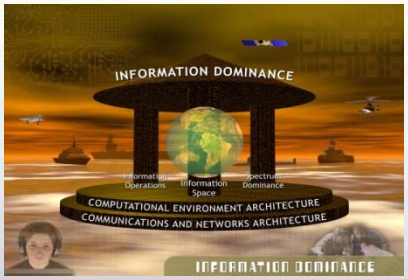
6.3: Advanced Tech Development



Naval Labs and Centers
University & Nonprofit
Industry

Technology Themes

- Power & Energy
- Directed Energy & Hypersonics
- Information Dominance
- Autonomous Systems
- Total Ownership Cost Reduction
- Expeditionary & Irregular Warfare
- Naval Warfighter Performance

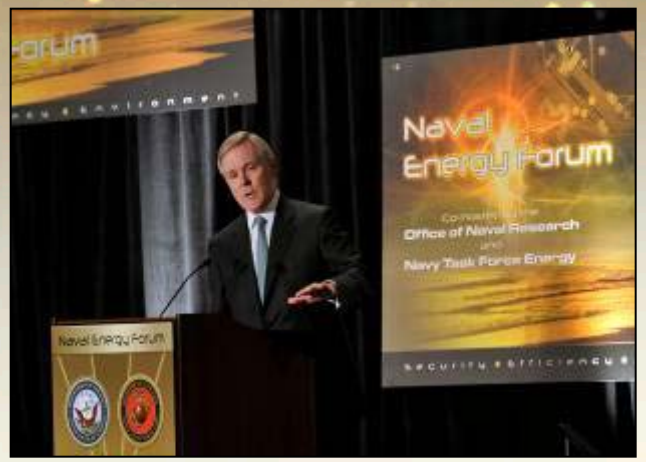


Power & Energy

Power & Energy

SECNAV Energy Targets:

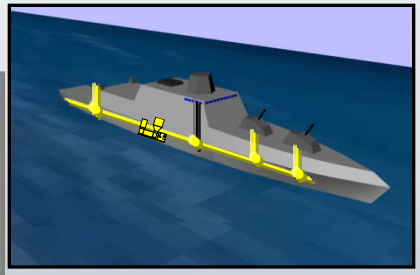
1. By 2020, 50% of total DON energy consumption will come from alternative sources
2. By 2020, DON will produce at least 50% of shore-based energy requirements from alternative sources; 50% of DON installations will be net-zero
3. DON will demonstrate a Green Strike Group in local operations by 2012 and sail it by 2016
4. By 2015, DON will reduce petroleum use in the commercial fleet by 50%
5. Evaluation of energy factors will be mandatory when awarding contracts for systems and buildings



ONR Naval Energy Forum
14-15 October 2009

ONR Energy S&T Includes:

- Fuels
- Power Generation
- Energy Storage
- Efficient Distribution
- Energy Usage

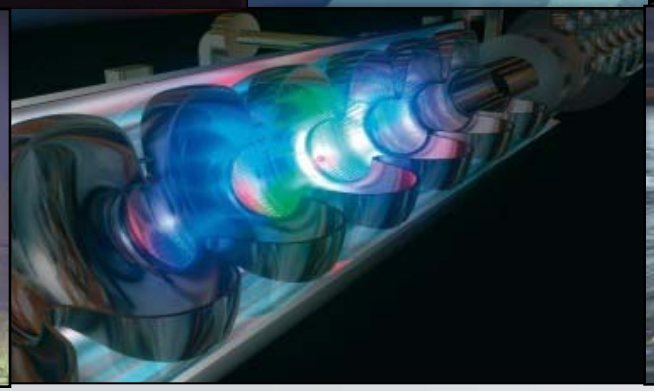


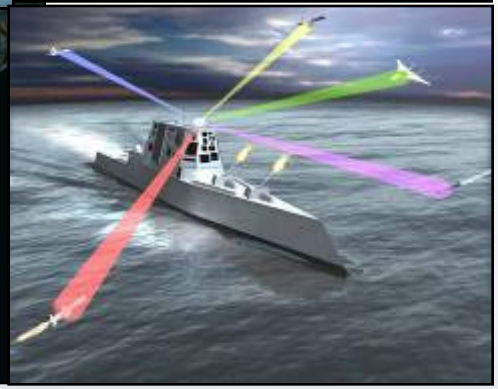

DIRECTED ENERGY & HYPERSONICS

Directed Energy & Hypersonics

Revolutionary Research . . . Relevant Results

- **Flight at Hypervelocity & Speed of Light**
- **Deepen the Magazines**
- **Increase Depth of Fire**
- **Broad Range of Missions**

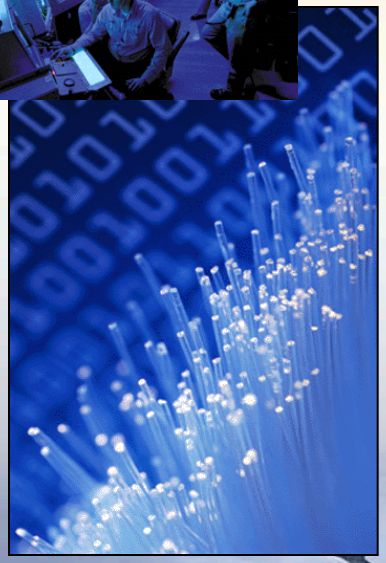


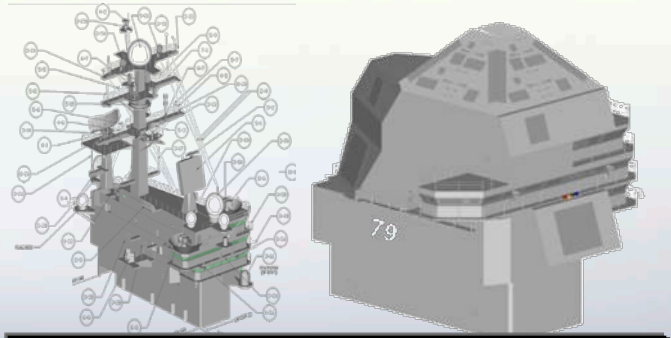



INFORMATION DOMINANCE
Information Operations
Information Space
Spectrum Dominance
COMPUTATIONAL ENVIRONMENT ARCHITECTURE
COMMUNICATIONS AND NETWORKS ARCHITECTURE
INFORMATION DOMINANCE

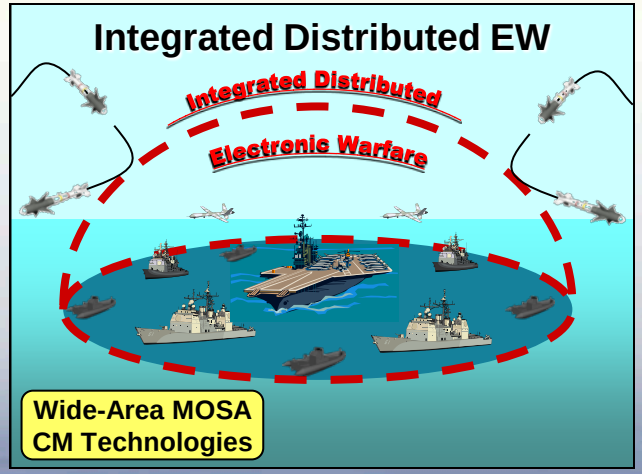
Dominating the Electromagnetic Spectrum

Revolutionary Research . . . Relevant Results



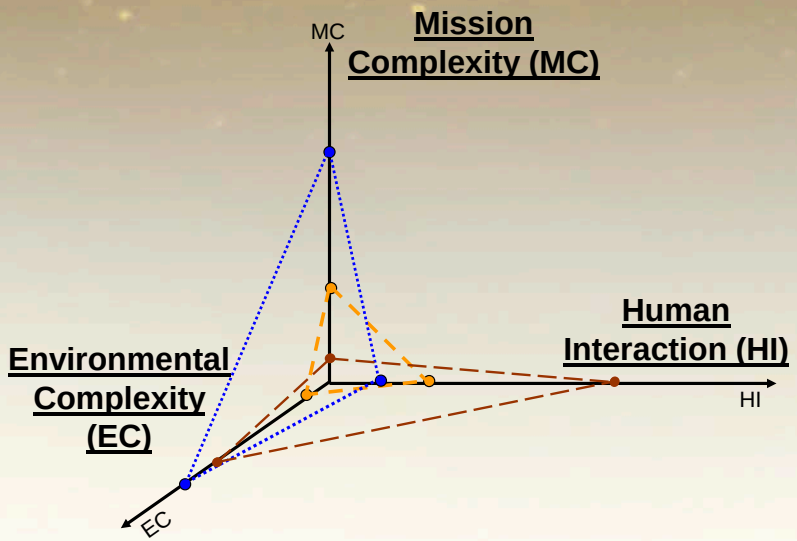


Integrated Topside Innovative Naval Prototype Program (INTOP)




ANTI-
SUBMARINE
WARFARE
AUTONOMOUS
AERIAL CARGO
UTILITY
SYSTEM
CASUALTY
CARE &
EVACUATION
MINE WARFARE
MISSILE
DEFENSE
PERSISTENT
SURVEILLANCE
AND STRIKE
RIVERINE
WARFARE
SURFACE
WARFARE
URBAN
OPERATIONS
AUTONOMOUS SYSTEMS

Autonomy



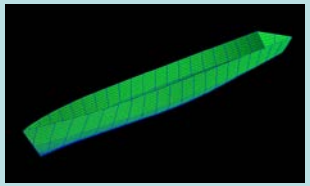
- **Changes everything**
  - **Tactics to strategy**
- **Hybrid force with manned systems**
- **Power & Energy implications**
- **Mission CONOPS development**

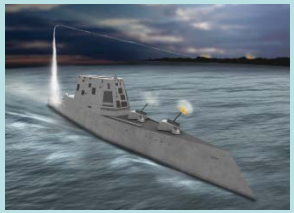
TOTAL OWNERSHIP COST REDUCTION

Total Ownership Cost

Revolutionary Research . . . Relevant Results

Design



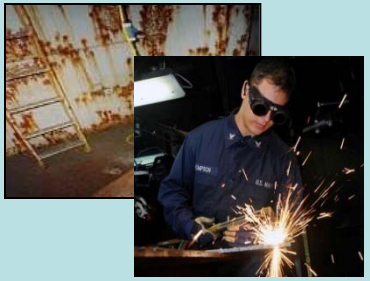


10%

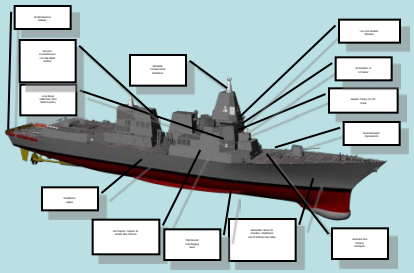
Acquisition

20-30%

Operations & Support



Modernization



Disposal

60-70%





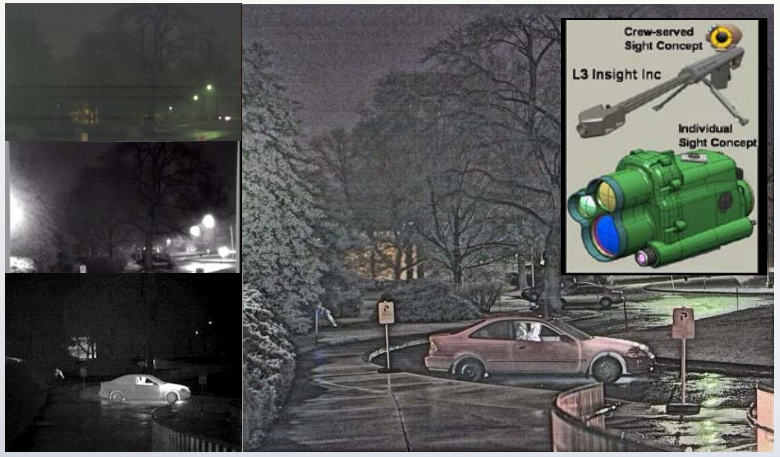




EXPEDITIONARY & IRREGULAR WARFARE

Expeditionary & Irregular Warfare

- Operational Adaptation
- Physical & Mental Resilience
- Mobile Communications
- Social Cultural Sciences
- Warfighter Protection



NAVAL WARFIGHTER PERFORMANCE

Naval Warfighter Performance

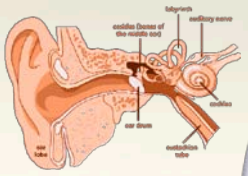
Revolutionary Research . . . Relevant Results

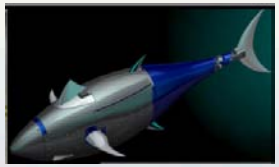
Human Systems Integration

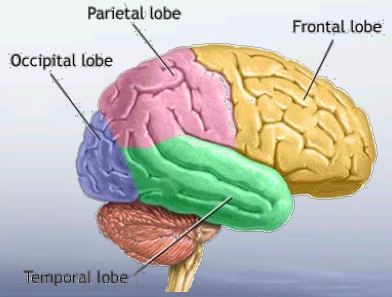
- Manpower & Personnel Management
- Training
- User-Centered Design
- C2 Decision Support
- Human, Social, Cultural Sciences
- Safety / Hearing

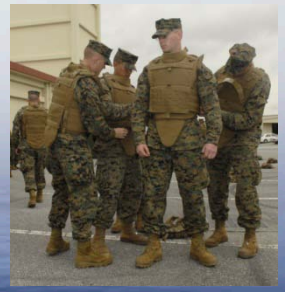
Bio-Engineered Systems

- Marine Mammal Health
- Bio-Sensors / Materials
- Microbial Fuel Cells
- Bio Robotics
- Human-Autonomy Systems







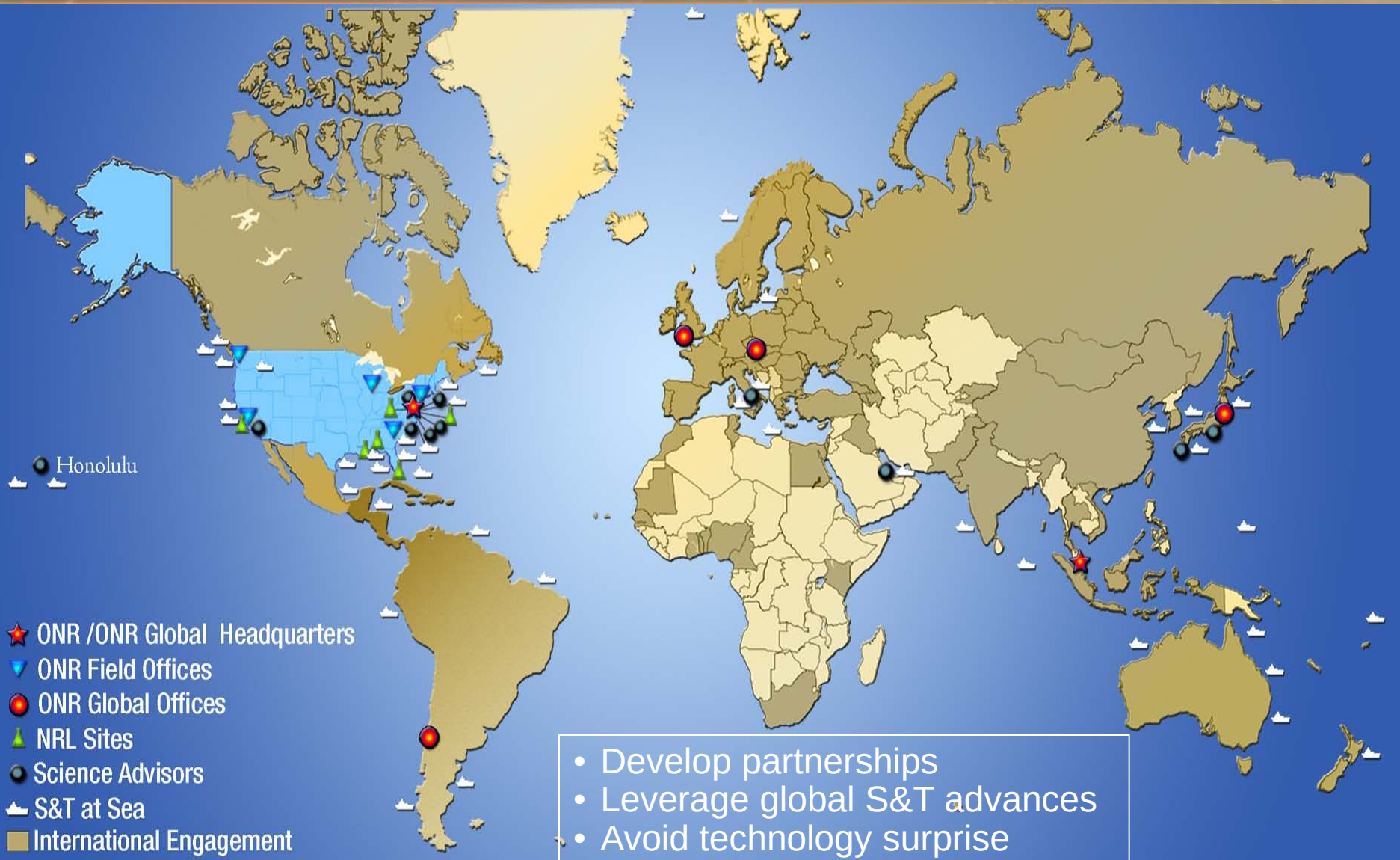


Undersea & Expeditionary Medicine

- Undersea Medicine (NNR)
- Point of Injury Care
  - "Lighten the Load"
  - Treat hemorrhagic shock
- Automated Medical Care
  - CASEVAC / Patient Movement

ONR Global

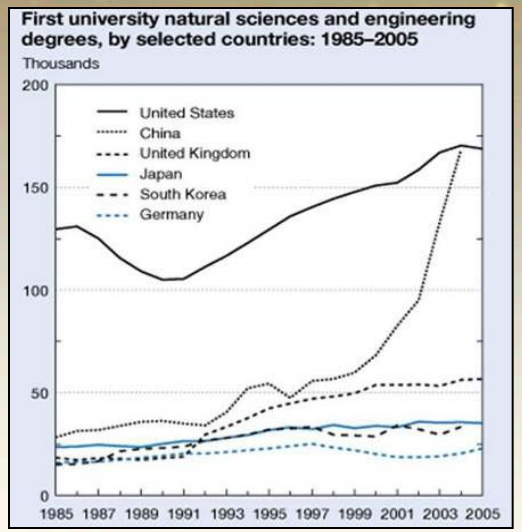
Revolutionary Research . . . Relevant Results



- Develop partnerships
- Leverage global S&T advances
- Avoid technology surprise

STEM

Revolutionary Research . . . Relevant Results



www.STEM2Stern.org

PhD Engineering
Total: 2,380

PhD Natural Science & Engineering
Total: 11,189

MS Natural Science & Engineering
Total: 43,104

BS Natural Science & Engineering
Total: 225,660

6.8% | 7.7% | 53.6% | 32%

Computer Science, Math, Engineering, Biological and Physical Sciences

S&E Bachelor's Awarded
Total: 455,441

10.4% | 6.9% | 42.2% | 40%

Computer Science, Natural Sciences, Engineering, Psychology & Social Sciences

First-time Freshman Interested in S&E
Total: 928,000

11% | 13% | 41% | 35%

Computer Science, Natural Sciences, Engineering, Psychology & Social Sciences

First-time Freshmen
Total: 1,903,400

11% | 14% | 35% | 40%

2 & 4-Year Degree-Granting Institutions

High School Graduates
Total: 3,115,220

14% | 15% | 34% | 37%

Scale: 1/28,000

Minority Men | Minority Women | Non-Minority Men | Non-Minority Women

Our Challenge

"I never, ever, want to see a Sailor or a Marine in a fair fight!"

- Adm. Gary Roughead, Chief of Naval Operations